Smart Contract Security Audit V1

Kaimoji Smart Contract

2/10/2022



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Background

The purpose of the audit was to achieve the following:

- Ensure that the smart contract functions as intended.
- Identify potential security issues with the smart contract.

The information in this report should be used to understand the risk exposure of the smart contract, and as a guide to improve the security posture of the smart contract by remediating the issues that were identified.

Project Information

• Platform: Ethereum

• Contract Address: 0xEb21Cb4F4BB6308eE64f3D27AeEedd5019476c76

• Code:

https://github.com/Saferico/Smart-Contracts-for-Projects/blob/main/kaimoji.sol

NFT Information

• Name: Kaimoji

• MAX Supply: 5200

• Holders:

• Total transactions:

Contracts address deployed to test net (Ethereum)

Kaimoji smart contract on Ethereum test net to test every function by the auditor.

https://rinkeby.etherscan.io/address/0xeb21cb4f4bb6308ee64f3d27aeeedd5019476c76

Executive Summary

According to our assessment, the customer's solidity smart contract is "WELL SECURED". The team has fixed the low-level issues.

Well Secured	√
Secured	
Poor Secured	
Insecure	

Automated checks are with remix IDE. All issues were performed by the team, which included the analysis of code functionality, manual audit found during automated analysis were manually reviewed and applicable vulnerabilities are presented in the audit overview section. The general overview is presented in the Project Information section and all issues found are located in the audit overview section.

Team found 0 critical, 0 high, 0 medium, 3 low, 0 very low-level issues and 0 note in all solidity files of the contract

The files:

Kaimoji.sol

File and Function Level Report

File in Scope:

Contract Name	SHA 256 hash	Contract Address
Kaimoji.sol	03ab0cc81ca8ea07d075758 54bbcda4c2137b5dbd9276 d24d773e9e39f7fb139	0xEb21Cb4F4BB6308eE64f3D27AeEedd5019 476c76

• Contract: Kaimoji

• Inherit: ERC721A, Ownable

• Observation: All passed including security check

• Test Report: passed

• Score: passed

• Conclusion: passed

Function	Test Result	Type / Return Type	Score
name	✓	Read / public	Passed
symbol	✓	Read / public	Passed
privateSigner	√	Read / public	Passed
supportsInterface	√	Read / public	Passed
privateSigWord	√	Read / public	Passed
balanceOf	√	Read / public	Passed
Owner	√	Read / public	Passed
publicLive	√	Read / public	Passed
publicPrice	√	Read / public	Passed
getApprovedForAll	√	Read / public	Passed
redeemCounter	√	Read / public	Passed
getApproved	✓	Read / public	Passed

ownerOf	√	Read / public	Passed
		-	
tokenURI	√	Read / public	Passed
totalSupply	✓	Read / public	Passed
maxSupply	✓	Read / public	Passed
kaiWarrantContract	✓	Read / public	Passed
redeemLive	✓	Read / public	Passed
maxPerWallet	√	Read / public	Passed
maxRedeemSupply	√	Read / public	Passed
teamMintedCounter	✓	Read / public	Passed
maxSaleSupply	✓	Read / public	Passed
maxTeamSupply	✓	Read / public	Passed
mintedCounter	✓	Read / public	Passed
privateMinters	✓	Read / public	Passed
privatePrice	✓	Read / public	Passed
mint	✓	Write / payable	Passed
approve	✓	Write / public	Passed
safeTransferFrom	✓	Write / public	Passed
safeTransferFrom	√	Write / public	Passed
founderMint	√	Write / public	Passed
withdraw	√	Write / public	Passed
gift	√	Write / public	Passed
transferOwnership	✓	Write / public	Passed
setApprovalForAll	✓	Write / public	Passed
transferFrom	✓	Write / public	Passed
privateMint	√	Write / payable	Passed
renounceOwnership	√	Write / public	Passed
redeem	✓	Write / public	Passed

setBaseURI	✓	Write / public	Passed
setKaiWArrantAddress	√	Write / public	Passed
setMaxPerWallet	√	Write / public	Passed
setMax	√	Write / public	Passed
setPrivatePrice	√	Write / public	Passed
setPublicPrice	√	Write / public	Passed
setRedeemMax	√	Write / public	Passed
setSigner	√	Write / public	Passed
setTeamMax	√	Write / public	Passed
togglePrivateStatus	√	Write / public	Passed
togglePublicStatus	√	Write / public	Passed
toggleRedeemStatus	√	Write / public	Passed

Issues Checking Status

No.	Issue Description	Checking Status
1	Compiler warnings.	Passed
2	Race conditions and Reentrancy. Cross-function race conditions.	Passed
3	Possible delays in data delivery.	Passed
4	Oracle calls.	Passed
5	Design Logic.	Passed
6	Timestamp dependence.	Passed
7	Integer Overflow and Underflow.	Passed
8	DoS with Revert.	Passed
9	DoS with block gas limit.	Passed with Notes
10	Methods execution permissions.	Passed
11	Economy model. If application logic is based on an incorrect economic model, the application would not function correctly and participants would incur financial losses. This type of issue is most often found in bonus rewards systems, Staking and Farming contracts, Vault and Vesting contracts, etc.	
12	The impact of the exchange rate on the logic.	Passed
13	Private user data leaks.	Passed
14	Malicious Event log.	Passed
15	Scoping and Declarations.	Passed
16	Uninitialized storage pointers.	Passed
17	Arithmetic accuracy.	Passed

Severity Definitions

Risk Level	Description
Critical	Critical vulnerabilities are usually straightforward to exploit and can lead to tokens loss etc.
High	High-level vulnerabilities are difficult to exploit; however, they also have significant impact on smart contract execution, e.g. public access to crucial functions
Medium	Medium-level vulnerabilities are important to fix; however, they can't lead to tokens lose
Low	Low-level vulnerabilities are mostly related to outdated, unused etc. code snippets, that can't have significant impact on execution
Note	Lowest-level vulnerabilities, code style violations and info statements can't affect smart contract execution and can be ignored.

Audit Findings

Critical:

No Critical severity vulnerabilities were found.

High:

No High severity vulnerabilities were found.

Medium:

No Medium severity vulnerabilities were found

Low:

#Missing zero address validation

Description

When the owner wants to mint NFTs for investors as gifts, he has to check for the zero address to make, he didn't mint for the zero address. Otherwise, the mint function will act like burn function. And the same for redeem function. When he wants to change signer address he has to check too.

```
function gift(address[] calldata receivers) external onlyOwner {
        require(
            teamMintedCounter + receivers.length <= maxTeamSupply,</pre>
            "EXCEED TEAM SUPPLY"
        ); teamMintedCounter += receivers.length;
        for (uint256 i = 0; i < receivers.length; i++) {</pre>
            mint(receivers[i], 1);
        } }
function redeem(address to, uint256 tokenQuantity) external {
        require (redeemLive, "REDEEM CLOSED");
        require(msg.sender == kaiWarrantContract, "INVALID SENDER");
        require(
            redeemCounter + tokenQuantity <= maxRedeemSupply,</pre>
            "EXCEED REDEEM SUPPLY");
        redeemCounter += tokenQuantity;
        mint( to, tokenQuantity);}
function setSigner(address newAddress) external onlyOwner {
       privateSigner = newAddress;}
function setKaiWArrantAddress(address newAddress) external onlyOwner {
        kaiWarrantContract = newAddress;}
```

Remediation

Use the require statement to check for zero addresses.

Status: Closed. Fixed in version 2.

#Multiple pragma statements

Line	Pragma
17	pragma solidity ^0.8.1;
242	pragma solidity ^0.8.0;
320	pragma solidity ^0.8.0;
540	pragma solidity ^0.8.0;
567	pragma solidity ^0.8.0;
653	pragma solidity ^0.8.4;
948	pragma solidity ^0.8.4;
2032	pragma solidity ^0.8.7;

Description

There are multiple pragma statements in the code. The newest compiler version 0.8.17 will work with the code, but keeping only one pragma statement helps in maintaining readability of the code.

Remediation

Keep a single pragma statement.

Status: Closed. Fixed In version 2

#Owner privileges (In the period when the owner isn't renounced)

Description

The owner can mint the NFT to any address.

The owner can pause and un pause the contract.

The owner can change the price in the private and public sale.

```
function togglePublicStatus() external onlyOwner {
        publicLive = !publicLive;
}

function togglePrivateStatus() external onlyOwner {
        privateLive = !privateLive;
}

function toggleRedeemStatus() external onlyOwner {
        redeemLive = !redeemLive;
}

function setPublicPrice(uint256 newPrice) external onlyOwner {
        publicPrice = newPrice;
}

function setPrivatePrice(uint256 newPrice) external onlyOwner {
        privatePrice = newPrice;
}

function gift(address[] calldata receivers) external onlyOwner {
```

```
require(
    teamMintedCounter + receivers.length <= maxTeamSupply,
    "EXCEED_TEAM_SUPPLY"
);

teamMintedCounter += receivers.length;
for (uint256 i = 0; i < receivers.length; i++) {
    _mint(receivers[i], 1);
}</pre>
```

Remediation

Make these functions internal in next version or the team should announce the investors before doing anything to give them time if they want to do anything.

P.S: This issue is common to the majority of NFT smart contracts.

Status: Acknowledged.

Very Low:

No Very Low severity vulnerabilities were found.

Notes:

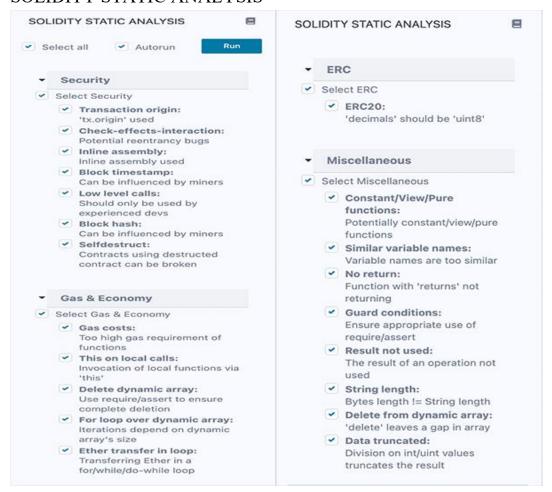
No Notes vulnerabilities were found.

Automatic Testing

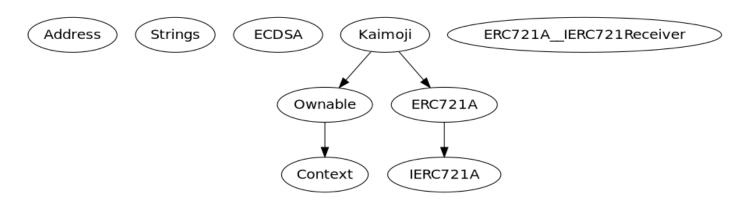
1- Check for security



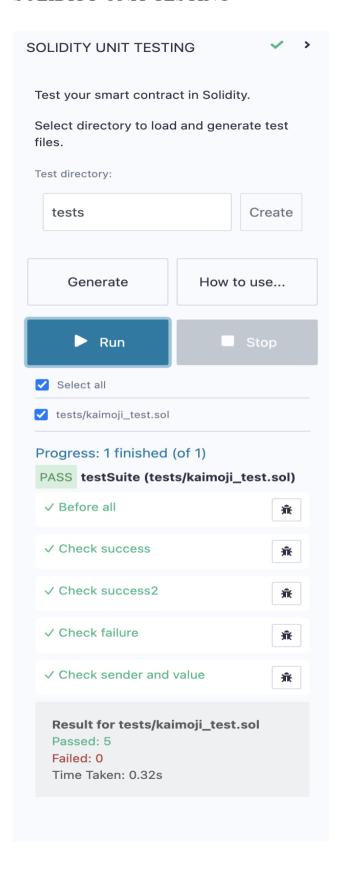
2- SOLIDITY STATIC ANALYSIS



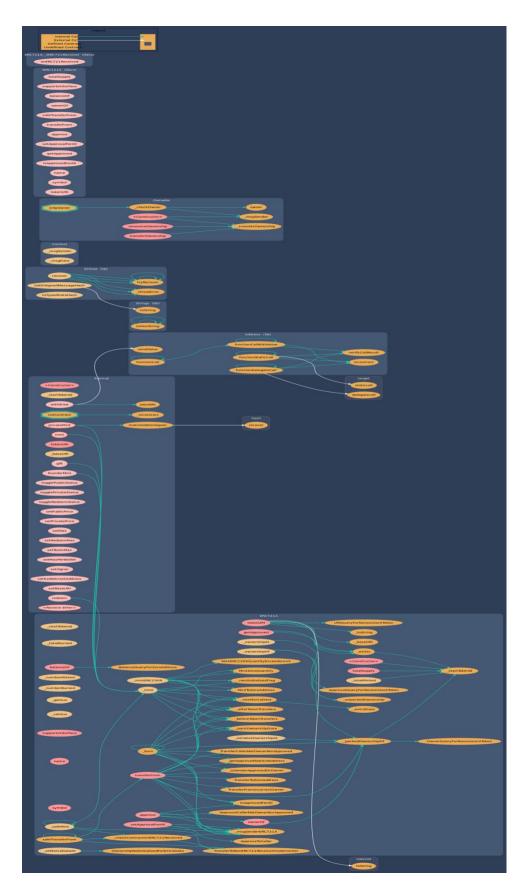
3- Inheritance graph



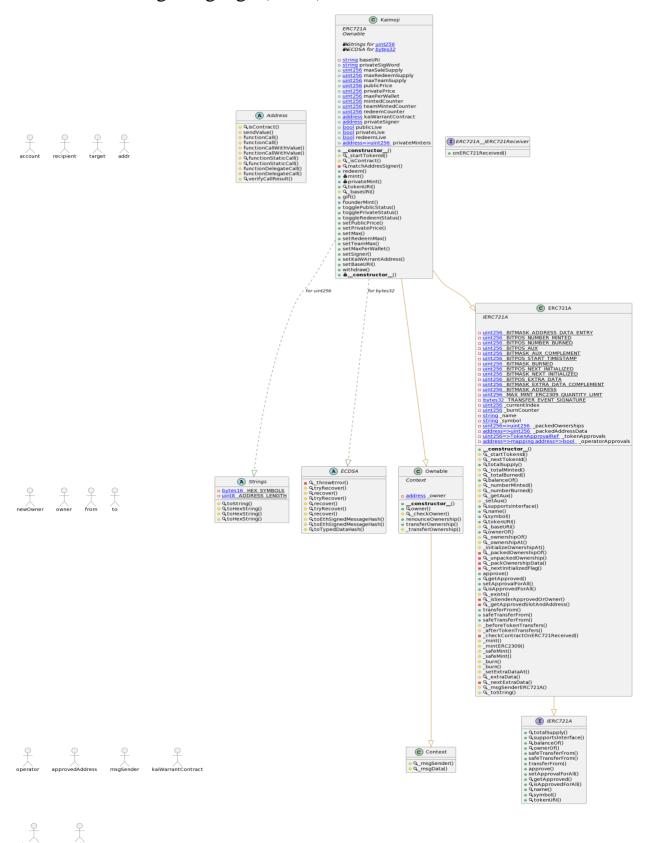
4- SOLIDITY UNIT TESTING



5- Call graph



Unified Modeling Language (UML)



Functions signature

```
Sighash | Function Signature
_____
16279055 => isContract(address)
24a084df => sendValue(address, uint256)
a0b5ffb0 => functionCall(address,bytes)
241b5886 => functionCall(address,bytes,string)
2a011594 => functionCallWithValue(address, bytes, uint256)
d525ab8a => functionCallWithValue(address, bytes, uint256, string)
c21d36f3 => functionStaticCall(address,bytes)
dbc40fb9 => functionStaticCall(address, bytes, string)
ee33b7e2 => functionDelegateCall(address,bytes)
57387df0 => functionDelegateCall(address, bytes, string)
946b5793 => verifyCallResult(bool,bytes,string)
6900a3ae => toString(uint256)
8fba8d5c => toHexString(uint256)
63e1cbea => toHexString(uint256, uint256)
1bb0c665 => toHexString(address)
5e2ffa14 => throwError(RecoverError)
c6edd8a7 => TryRecover(bytes32,bytes)
19045a25 => recover(bytes32,bytes)
628f98cc => tryRecover(bytes32,bytes32,bytes32)
bf2fe7fd => recover(bytes32,bytes32)
4d78da76 => tryRecover(bytes32,uint8,bytes32,bytes32)
c2bf17b0 => recover(bytes32,uint8,bytes32,bytes32)
918a15cf => toEthSignedMessageHash(bytes32)
92bd87b5 => toEthSignedMessageHash(bytes)
7df7a71c => toTypedDataHash(bytes32,bytes32)
119df25f => _msgSender()
8b49d47e => _msgData()
8da5cb5b => owner()
53a72975 =   _{checkOwner()}
715018a6 => renounceOwnership()
f2fde38b => transferOwnership(address)
d29d44ee => _transferOwnership(address)
18160ddd => totalSupply()
01ffc9a7 => supportsInterface(bytes4)
70a08231 => balanceOf(address)
6352211e => ownerOf(uint256)
b88d4fde => safeTransferFrom(address,address,uint256,bytes)
42842e0e => safeTransferFrom(address,address,uint256)
23b872dd => transferFrom(address,address,uint256)
095ea7b3 => approve(address,uint256)
a22cb465 => setApprovalForAll(address,bool)
081812fc => getApproved(uint256)
e985e9c5 => isApprovedForAll(address,address)
06fdde03 => name()
95d89b41 => symbol()
c87b56dd => tokenURI(uint256)
150b7a02 => onERC721Received(address,address,uint256,bytes)
98995f77 => _startTokenId()
4a60f620 => _nextTokenId()
736bf591 => _totalMinted()
fd01bd4c => _totalBurned()
```

```
4d388a98 => numberMinted(address)

        6balb8d0
        => __numberBurned(address)

        f4a540c5
        => __getAux(address)

        4ff8c452
        => __setAux(address, uint64)

        /43976a0
        => __baseURI()

        fb372cf2
        => __ownershipOf(uint256)

        cbaf28ce
        => __ownershipAt(uint256)

        f2d31624
        => __initializeOwnershipAt(uint256)

        444996c1
        => __packedOwnershipOf(uint256)

        4fe3c13e
        => __unpackedOwnership(uint256)

        6pe3c18e
        => __nextInitializedFlag(uint256)

        6pe3c0f8c
        => __nextInitializedFlag(uint256)

        6pe3c0f8c
        => __nextInitializedFlag(uint256)

        848b8ea
        => __issenderApprovedOrOwner(address, address, address, address)

        f112a2af
        => __getApprovedSlotAndAddress(uint256)

        6f435773
        => __deterTokenTransfers(address, address, uint256, uint256)

        d88343e2
        => __afterTokenTransfers(address, address, uint256, bytes)

        4e6ec247
        => __mint(address, uint256)

        4908d13b
        => __mint(address, uint256)

        5a4f832b
        => __safeMint(address, uint256)

        9b1f9e74
        => __burn(uint256)

        834a9477
        => __burn(uint256, bool)

        bd3cd6d

  6ba1b8d0 => _numberBurned(address)
f4a540c5 => _getAux(address)
  f832e238 => _toString(uint256)
7d48441f => _isContract(address)
  821dc225 => matchAddresSigner(bytes)
  1e9a6950 => redeem(address, uint256)
  a0712d68 => mint(uint256)
  92eca5b4 => privateMint(uint256,bytes)
  163e1e61 => gift(address[])
f42202e8 => founderMint(uint256)
  33098c01 => togglePublicStatus()
  c46eb685 => togglePrivateStatus()
  d4434330 => toggleRedeemStatus()
  c6275255 => setPublicPrice(uint256)
  a10f151e => setPrivatePrice(uint256)
  1fe9eabc => setMax(uint256)
  4a2e2ce3 => setRedeemMax(uint256)
  cbe11644 => setTeamMax(uint256)
  e268e4d3 => setMaxPerWallet(uint256)
  6c19e783 => setSigner(address)
  e3d0f35d => setKaiWArrantAddress(address)
  55f804b3 => setBaseURI(string)
  3ccfd60b => withdraw()
```

Automatic general report

```
Files Description Table
| File Name | SHA-1 Hash |
|-----|
| /Users/macbook/Desktop/smart contracts/kaimoji.sol |
7efcf934764d32b56ccec00399f228c7673aa7c7 |
Contracts Description Table
| Contract |
               Type Bases
| **Function Name** | **Visibility** | **Mutability** |
**Modifiers** |
| L | isContract | Internal A | _ | |
| L | sendValue | Internal A | O | |
| L | functionCallWithValue | Internal 🖺 | 🔘
| L | functionCallWithValue | Internal A | | | |
| L | functionStaticCall | Internal A | L | functionStaticCall | Internal A |
| L | functionDelegateCall | Internal A |
| L | functionDelegateCall | Internal A |
| **Strings** | Library | |||
| L | toString | Internal 🖺 |
| L | toHexString | Internal A | | |
| L | toHexString | Internal A | | |
| L | toHexString | Internal 🖺 | | |
| **ECDSA** | Library | ||
| L | throwError | Private 🖺 | | |
| L | tryRecover | Internal A | | |
| L | recover | Internal 🖺 | | |
| L | tryRecover | Internal A | | |
| L | recover | Internal 🖺 | | |
| L | toEthSignedMessageHash | Internal 🖺 |
| **Context** | Implementation | |||
| L | _msgSender | Internal 🖺 | | | |
| L | msgData | Internal 🖺 | | |
| **Ownable** | Implementation | Context |||
```

```
| L | <Constructor> | Public | | | NO | | | |
| L | owner | Public | | NO| |
| L | _checkOwner | Internal 🖺 |
                             | L | renounceOwnership | Public | | onlyOwner | L | transferOwnership | Public | onlyOwner |
| L | transferOwnership | Internal 🖺 | 🔘 | |
| **IERC721A** | Interface | |||
| L | totalSupply | External | | NO | |
| L | supportsInterface | External | |
| L | balanceOf | External | | | NO| |
 L | ownerOf | External | | NO| |
 L | setApprovalForAll | External [ | NO[ |
 L | getApproved | External | | NO| |
| L | isApprovedForAll | External | | NO| |
 L | name | External | | | NO | |
| L | symbol | External | | NO|
| L | tokenURI | External | | NO | |
**ERC721A IERC721Receiver** | Interface | ||
| L | onERC721Received | External | | NO | |
| **ERC721A** | Implementation | IERC721A |||
 | Constructor> | Public | | | NO | |
| L | startTokenId | Internal 🖺 | | |
| L | nextTokenId | Internal A | | |
 L | totalSupply | Public | | NO | |
 L | totalMinted | Internal 🖺 | | |
 L | totalBurned | Internal A |
 | balanceOf | Public | | NO | |
 | numberMinted | Internal | | | |
 L | numberBurned | Internal
 L | setAux | Internal 🖺 | 🔘 | |
 L | supportsInterface | Public | |
 L | name | Public | | NO|
 L | symbol | Public | | | NO
 L | tokenURI | Public | | NO | |
 L | baseURI | Internal 🖺 | | |
 L | ownerOf | Public | | NO | |
 L | ownershipOf | Internal 🖺 | | |
 L | _ownershipAt | Internal A | | |
 | _initializeOwnershipAt | Internal | | | | | | | | |
 L | packedOwnershipOf | Private 🖺 | | |
 L | _unpackedOwnership | Private
 L | _packOwnershipData | Private
 nextInitializedFlag | Private 🖺 | | |
| L | approve | Public | | ● | NO| |
 | getApproved | Public | | NO | |
| isApprovedForAll | Public | | NO | |
```

```
L | exists | Internal 🖰 | | |
L | isSenderApprovedOrOwner | Private 🖺 | | |
| L | getApprovedSlotAndAddress | Private 🖺 | | |
 L | transferFrom | Public | | NO | |
| L | safeTransferFrom | Public | | NO | | NO | | | SafeTransferFrom | Public | NO | |
 | L | _afterTokenTransfers | Internal 🖺 | 🔘 | |
L | _checkContractOnERC721Received | Private 🖺 | 🔘
 L | mint | Internal A | D | |
 L | mintERC2309 | Internal 🖺 |
 L | burn | Internal 🗎 | 🔘 | |
| L | burn | Internal A | O | |
 L | setExtraDataAt | Internal 🗎 | 🔘 | |
 L | _extraData | Internal 🖺 | | |
| L | nextExtraData | Private 🔐 | | | | |
| L | msgSenderERC721A | Internal 🖰 | | | |
| **Kaimoji** | Implementation | ERC721A, Ownable | | |
| L | <Constructor> | Public | | | | ERC721A |
 L | startTokenId | Internal 🖺 | | |
| L | isContract | Internal 🖺 | | |
L | mint | External | | I | notContract |
 └ | privateMint | External │ | □ | notContract |
 L | tokenURI | Public | | | NO | |
 L | baseURI | Internal 🖺 | | |
 L | gift | External | | OnlyOwner |
 L | togglePublicStatus | External | | onlyOwner | togglePrivateStatus | External | onlyOwner |
 L | setPrivatePrice | External | | ● | onlyOwner |
 L | setMaxPerWallet | External | | OnlyOwner |
 | L | setBaseURI | External | | ● | onlyOwner |
| L | withdraw | External | | OnlyOwner |
 Legend
| Symbol | Meaning |
|:----|
  Function can modify state |
  Function is payable |
```

Conclusion

The contracts are written systematically. Team found no critical issues. So, it is good to go for production.

Since possible test cases can be unlimited and developer level documentation (code flow diagram with function level description) not provided, for such an extensive smart contract protocol, we provide no such guarantee of future outcomes. We have used all the latest static tools and manual observations to cover maximum possible test cases to scan Everything.

Security state of the reviewed contract is "Well Secured".

- ✓ No volatile code.
- ✓ No many high severity issues were found.
- √ Low (or very low) level issues have been fixed.

Disclaimer

This is a limited report on our findings based on our analysis, in accordance with good industry practice as of the date of this report, in relation to cybersecurity vulnerabilities and issues in the framework and algorithms based on smart contracts, the details of which are set out in this report. In order to get a full view of our analysis, it is crucial for you to read the full report. While we have done our best in conducting our analysis and producing this report, it is important to note that you should not rely on this report and cannot claim against the team on the basis of what it says or doesn't say, or how team produced it, and it is important for you to conduct your own independent investigations before making any decisions. team go into more detail on this in the below disclaimer below – please make sure to read it in full.

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